Adaptation requires attuning to shifting temporal patterns

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Scott Bremer[1], Nicole Klenk[2], Michelle Bastian[3,4] & Danielle Kwan-Lafond[5]

[1] Centre for the Study of the Sciences and the Humanities, University of Bergen, Postboks 7805, Bergen 5020, Norway
P: +47 48 34 75 84
E: scott.bremer@uib.no
ORCID: 0000-0002-4505-9386

[2] Department of Physical and Environmental Sciences, University of Toronto Scarborough, Toronto, Canada
E: nicole.klenk@utoronto.ca

[3] Edinburgh College of Art, The University of Edinburgh, Edinburgh, United Kingdom
[4] Oslo School of Environmental Humanities, University of Oslo, Oslo, Norway
E: michelle.bastian@ed.ac.uk
ORCID: 0000-0002-0043-7582

[5] Department of Sociology, University of Toronto Scarborough, Toronto, Canada
E: dani.kwan.lafond@utoronto.ca

Communal life is characterized by the shared timing of human and environmental events. Climate change is disrupting these timings, creating mismatches in these coordinated temporal patterns and requiring adaptive governance.

Figure 1: The Anishinabek Nation lunar calendar is read on the segments of a snapping turtle's (mikinaak) shell. Climate adaptation governance needs to recognize and re-coordinate the diverse temporal frameworks communities draw on for guiding timely action (Photo: Danielle Kwan-Lafond)

Temporal frameworks, from agricultural seasons to infrastructure maintenance cycles or school terms, pattern the timing of everyday activities. However, communities worldwide have reported that these patterns are beginning to come apart under climate change, with activities falling out of step with environmental and social cycles, and people losing a sense for timely action (1, 2). The synchronized timing of community activities is essential to governance, yet climate adaptation overlooks temporal coordination – the ways skillful practitioners re-calibrate individual or collective practices to attune to shifting social and environmental rhythms – as a key aspect of adaptive capacity (2, 3). Arguably this stems from adaptation's blinkered temporal focus on climate futures, and a temporal illiteracy that assumes adaptation can be mapped along a single timeline, set to clock time (3, 4).

We argue climate change adaptation must consider the implications of climate change for the timings of community life in the present (1, 4). This means setting aside notions of a singular

coordinate of clock-time to consider timings in their particular social and ecological context (5), extending a regard to the polyphony of temporalities – rhythms of motion and change – that people track and time activities to in 'timescapes' (6, 7). For example, savanna burning emissions abatement (SBEA) schemes (Box 1) do not currently consider how to coordinate across government timetables, plant and animal cycles and climatic patterns. It also means recognizing the ways people revise temporal frameworks, and the timescapes around them, through politics and altering repeated rhythms of practice (3, 6), the way cool fires have become part of the socio-ecological assemblages animating Australian landscapes.

As communities' temporal patterns slide into arrhythmia, the adaptation challenge will be to operationalize governance structures and approaches that, on one hand, recognize the diverse frameworks that work as resources for guiding temporally literate practitioners (e.g., indigenous calendars: Boxes 1 & 2). And on the other hand, re-coordinate these frameworks to temporalities in flux, including by relating diverse timings to shared frames of reference to arrive at workable temporal arrangements (8).

Governing temporal re-coordination

Temporal patterns that make a shared existence possible form over time through evolutionary and historical coordination between humans, animals, and the environment (6). For example, under the Anishnaabe 'strawberry moon', foraging activities – plucking wild strawberries – have become integral to the functioning of the ecosystem. The same is true of cities, where the multitude of temporalities, layered on top of each other, have settled into a relatively workable temporal arrangement for people with 5-day working weeks. School days and workdays align, dinner time becomes a standardized meeting point, and the grid braces for a pulse of power usage each evening (3). Much of this coordination is not governed centrally but emerges from the sum of thousands of everyday timing decisions of individuals, companies, institutions, and families, becoming a normalized pattern. As individuals and groups (and other forms of life) sense temporalities fluctuating around them, they cope through 'micro-maneuvers' to re-synchronize (3, 8); through planting earlier for instance (Box 2). This constitutes communities' decentralized governance of time; the ways temporalities mutually reattune and accommodate to maintain patterns.

But coordination faces limits when temporal patterns suddenly and substantially shift phase, as under climate change. Boxes 1 and 2 show examples of social institutions detached from the environmental rhythms they are supposed to follow. In such cases micro-maneuvers will not do. Communities must fundamentally adapt temporal patterns of practice, re-discovering opportune moments to act and common refence points (8). Trusting in timescapes to re-coordinate in a de-centralized way can render invisible certain temporal rhythms, inscribe maladaptive behavior, and reproduce inequities. Consider too the history of powerful groups and governments who impose temporal regimes that systematically overlook the timings of Indigenous or marginalized groups (7, 9, 10). Climate adaptation as temporal re-coordination demands explicit, participatory discussion of the temporalities that matter for collective decisions on organizing timings.

There are precious few examples of initiatives to adapt community timings. Penn et al. (2) seasonally mapped overlapping environmental stressors and maintenance patterns of city

infrastructure in Bristol Bay to reorganize infrastructure management. Chisholm Hatfield et al. (10) show Indigenous communities adjusting their calendar of cultural festivals. And the non-profit Time Use Initiative (https://timeuse.barcelona) pushes for innovative time policies for improving citizens' well-being, to find a life balance between time for work, rest, leisure and caring for loved ones. Temporal adaptation will require casting around for inspiration from across the social sciences and humanities, and operationalizing these into governance processes. It also requires revisiting current conceptualizations of adaptive capacity to recognize temporal frameworks – from formal calendars to tacit senses of timely action (what the Greeks termed Kairos) – as key resources that temporally literate practitioners adapt and deploy. In their 6th Assessment Report, the IPCCs Working Group II noted that governance practices work best when they are coordinated within and between temporal scales and frameworks (11).

Recognising multiple temporalities

Adaptation as temporal re-coordination demands communities recognize the diverse (sometimes conflicting, sometime synchronizing) temporal frameworks they act on, and imagine radically different patterns of life (9). This begins by resisting globalized systems of time that cover nuances in the local nature of many rhythms and patterns [e.g., university calendars, see Box 2]. It extends to identifying trade-offs, losses, and damages; the way climate change will affect these timings of communities' ways of life and treasured events, sometimes seeing these activities die out (10). And it looks for emerging common frames of reference; not only identifying where temporalities clash, but also how to reconcile them within adaptation governance (8).

Starting from communities' temporal frameworks recognizes the sovereignty of social groups over their local and Indigenous knowledges. Local and Indigenous knowledge systems are threatened by structures and processes of suppression, misrepresentation, appropriation, assimilation, disconnection, and destruction (9). Temporal adaptation demands respect for the sovereignty of local skilled practitioners as they revisit their temporal frameworks and address the cues for timely action they are losing to a changing climate. It means supporting local communities to understand, influence or challenge conventional understandings of temporal authority and jurisdiction.

Accelerating adaptative action is a priority for climate governance, but in the quest to speed-up we must also pay attention to climate impacts on the rhythms of daily life in the present. Timing adaptation means empowering communities to recalibrate the social and environmental cues and indicators that them to 'know when to do what needs to be done' to get on with life and coordinate their activities in time. This is not a science and policy project alone. Insofar as temporalities only become visible to people through engagement with their environment (Box 1: indicators for cool fires are invisible to those not practiced in this work), then a comprehensive appreciation for community rhythms is a transdisciplinary effort (6, 7). It centers and elevates skilled practitioners' temporal expertise to guide processes of recalibration, attunement, and planning adaptation to climate change.

Box 1: Indigenous fire burning practices in northern Australia are an important method for avoiding large carbon emissions from destructive wildfires, with 'cool fires' set in the early-dry

season reducing undergrowth and fire loads (12). Communities have been funded for this work through greenhouse gas offsets, leading to the wider promotion of "savanna burning emissions abatement" (SBEA) schemes. In Australia, fires have traditionally been set according to biocultural indicators – such as observations of grasshoppers, grasses, birds and winds. However, when governments set fire seasons by Gregorian calendar dates, communities are incentivized to set fires outside ecologically optimal times, in ways that are poorly responsive to variability and change in wet and dry seasons driven by climatic change. When this model is exported elsewhere, misplaced temporal assumptions follow, such as a failure to recognize the importance of mid-season fires in Eastern and Southern Africa (13).

Box 2: The Indigenous Garden at the University of Toronto Scarborough is a joint project between the Sociology faculty and knowledge keeper Isaac Crosby (Black/Indigenous, Ojibwe of Anderdon). The site is for land-based learning, guiding close observation of the land by the Anishnaabe 13 moons, visualized as the lunar turtle calendar where each moon's name guides activities (14). For example, 'odemin giizis' (strawberry moon) falls roughly in June and indicates which plants are best harvested at that time, in that territory. Yet rather than structuring access to the Garden by the moons, it is organized by the university calendar, opening on May 1st each year. As the climate changes in the city of Tkaronto, the garden team propose extending the traditional growing season - planting earlier in Spring and harvesting later in Fall – but this was denied to conform to the static university calendar. The incongruency between temporalities of the land and the university, combined with the dominance of the university calendar, further estranges communities from Indigenous temporal frameworks, and limits opportunities for decolonizing teaching and learning (15).

References

1. Brace, C. & Geoghegan, H. *Progress in Human Geography* **35(3)**, 284-302 (2011)
2. Penn, H. J., Gerlach, S. C., & Loring, P. A. *Weather, Climate, and Society* **8(4)**, 435-446 (2016)
3. Oppermann, E., Walker, G., & Brearley, M. *Geoforum* **108**, 275-285 (2020)
4. Nobert, S. & Pelling, M. *Geoforum* **85**, 122-130 (2017)
5. Bastian, M. *Environmental Philosophy* **9(1)**, 23-48 (2012)
6. Tsing, A. L. *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton University Press (2015)

7. Adam, B. *Timescapes of modernity: The environment and invisible hazards*. Routledge (2005)

8. Jordheim, H., & Ytreberg, E. *Time & Society* **30(3)**, 402-422 (2021)

9. Sharma, S. *In the meantime: Temporality and cultural politics*. Duke University Press (2014)

10. Chisholm Hatfield, S. *et al. Ecol Process* **7(25)**, 1-11 (2018)

11. IPCC. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press (2022)

12. McKemey, M. *et al. Sustainability* **12**, 995 (2020)

13. Croker, A. R., Woods, J. & Kountouris, Y. Fire Ecology **19(63)**, (2023)

14. Kwan-Lafond, D., Meness, J., Thornhill, N., & Winterstein, S. (2019). Thirteen grandmother moons. Thirteen Grandmother Moons. In Our Stories: First Peoples in Canada. https://ecampusontario.pressbooks.pub/indigstudies/chapter/13-grandmother-moons/

15. Tuck, E., McKenzie, M. & McCoy, K. *Environmental Education Research* **20(1)**, 1-23 (2014)

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